

Appl. No. 09/634,522

Response to Office Action of October 3, 2003

LISTING OF CLAIMS

This listing of claims replaces all prior versions and listings of claims in the patent application.

Claim 1 (currently amended): A composite material comprising:

a matrix material; and

a plurality of microsphere particles in the matrix material, the microsphere particles ranging from about 40 69% by volume to about 85% by volume of the composite material and consisting essentially of diameters ranging from about 1 micron to about 350 microns;

wherein the composite material is substantially free of voids in the matrix material between the microsphere particles.

Claim 2 (original): The composite material of claim 1, wherein the plurality of particles range from about 69% by volume to about 81% by volume of the composite material.

Claim 3 (original): The composite material of claim 1, wherein the plurality of particles comprise about 75% by volume of the composite material.

Claim 4 (original): The composite material of any one of claims 1-3, wherein the plurality of particles comprise at least a plurality of first particles and a plurality of second particles having different sizes compared to each other.

Claim 5 (previously presented): The composite material of any one of claims 1-3, wherein the plurality of microsphere particles are hollow microspheres.

Claim 6 (original): The composite material of claim 5, wherein the hollow microspheres comprises at least two different sized microspheres.

Claim 7 (previously presented): The composite material of any one of claims 1-3, wherein substantially any given distance between adjacent microsphere particles is less than a diameter of the smallest microsphere particle.

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Claim 8 (original): The composite material of any one of claims 1-3, wherein substantially all of the plurality of particles are in contact with adjacent particles.

Claim 9 (original): The composite material of any one of claims 1-3, wherein the particles are selected from the group consisting of ceramic particles, glass particles, plastic particles, and combinations thereof.

Claim 10 (original): The composite material of any one of claims 1-3, wherein the matrix material is selected from group consisting of epoxies, polyesters, vinyl esters, phenolics, thermoplastics, thermosets, polyurethanes, glues, cements, matrix material binders, and combinations thereof.

Claim 11 (original): The composite material of any one of claims 1-3, further comprising at least one layer of material in contact with the matrix material having the particles.

Claim 12 (original) The composite material of claim 11, wherein the at least one layer is selected from the group consisting of carbon fibers, glass fibers, uni-directional fibers, cross woven fibers, matte fibers, fiber braid, uni-directional stitch woven carbon fiber braid, plastics, leathers, foils, metals, laminates, composites, thermoplastics, thermoset materials, resins, ceramics, vinyls, rigid materials, flexible materials, flanking materials, and combinations thereof.

Claim 13 (original): The composite material of any one of claims 1-3, wherein the composite material has a specific gravity of from about 0.38 to about 2.2.

Claim 14 (original): The composite material of any one of claims 1-3, wherein the composite material has a specific gravity of less than 1.0.

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Claim 15 (currently amended): A composite material comprising:
a matrix material from about 15% by volume to about ~~60~~ 31% by volume; and
microspheres from about ~~40~~ 69% by volume to about 85% by volume, substantially all of
the microspheres having diameters ranging from about 1 micron to about 350 microns;
wherein the composite material is substantially free of gas space in the matrix material
between the microspheres.

Claim 16 (original): The composite material of claim 15, wherein the matrix material is
from about 19% by volume to about 31% by volume, and the microspheres are from about 69%
by volume to about 81% by volume.

Claim 17 (original): The composite material of claim 16, wherein the matrix material is
about 25% by volume, and the microspheres are about 75% by volume.

Claim 18 (currently amended): A composite material comprising a matrix binder
material and microspheres, the microspheres having a ~~greater~~ volume of about 69% to about
85% of a volume of the matrix binder material combined with the microspheres than the matrix
~~binder material~~ and consisting essentially of diameters ranging from about 1 micron to about 350
microns;
wherein the matrix binder material is substantially free of voids between the
microspheres.

Claim 19 (currently amended): A composite material comprising:
a core having a matrix material from about 15% to about ~~60~~ 31% by volume of the core,
and microspheres from about ~~40~~ 69% to about 85% by volume of the core, substantially all of the
microspheres having diameters ranging from about 1 micron to about 350 microns; and
a flanking layer bonded to the core;
wherein the matrix material is substantially free of voids between the microspheres.

Claim 20 (original): The composite material of claim 19, wherein the core has flanking
layers bonded to opposite sides of the core.

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Claim 21 (original): The composite material of claim 19, wherein the flanking layer substantially surrounds the core.

Claim 22 (original): The composite material of claim 19, wherein the flanking layer is selected from the group consisting of carbon fibers, glass fibers, uni-directional fibers, cross woven fibers, matte fibers, fiber braid, uni-directional stitch woven carbon fiber braid, plastics, leathers, foils, metals, composites, thermoplastics, thermoset materials, resins, ceramics, vinyls, rigid materials, flexible materials, and combinations thereof.

Claims 23-37 (cancelled)

Claim 38 (previously presented): The composite material of claim 1, wherein the microsphere particles consist essentially of diameters ranging from about 15 microns to about 120 microns.

Claim 39 (currently amended): The composite material of claim 38, wherein ~~substantially all~~ a substantial amount of the microsphere particles have ~~a single, nominal~~ about the same diameter.

Claim 40 (previously presented): The composite material of claim 15, wherein substantially all of the microspheres have diameters ranging from about 15 microns to about 120 microns.

Claim 41 (currently amended): The composite material of claim 40, wherein ~~substantially all~~ a substantial amount of the microspheres have ~~a single, nominal~~ about the same diameter.

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Claim 42 (previously presented): The composite material of claim 18, wherein the microspheres consist essentially of diameters ranging from about 15 microns to about 120 microns.

Claim 43 (currently amended): The composite material of claim 42, wherein ~~substantially all~~ a substantial amount of the microspheres have ~~a single, nominal~~ about the same diameter.

Claim 44 (previously presented): The composite material of claim 19, wherein substantially all of the microspheres have diameters ranging from about 15 microns to about 120 microns.

Claim 45 (currently amended): The composite material of claim 44, wherein ~~substantially all~~ a substantial amount of the microspheres have ~~a single, nominal~~ about the same diameter.

Claims 46-64 (cancelled)

Claim 65 (new): The composite material of claim 1, further comprising a component selected from the group consisting of calcium carbonate, barium sulfate, fillers, zinc stearate, mold releasing agents, degassing agents, additives, inhibitors, thixotropes, thickening agents, resin curing agents, accelerators, promoters, catalysts, cross-linking agents, and combinations thereof.

Claim 66 (new): The composite material of claim 15, further comprising a component selected from the group consisting of calcium carbonate, barium sulfate, fillers, zinc stearate, mold releasing agents, degassing agents, additives, inhibitors, thixotropes, thickening agents, resin curing agents, accelerators, promoters, catalysts, cross-linking agents, and combinations thereof.

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Claim 67 (new): The composite material of claim 18, further comprising a component selected from the group consisting of calcium carbonate, barium sulfate, fillers, zinc stearate, mold releasing agents, degassing agents, additives, inhibitors, thixotropes, thickening agents, resin curing agents, accelerators, promoters, catalysts, cross-linking agents, and combinations thereof.

Claim 68 (new): The composite material of claim 19, further comprising a component selected from the group consisting of calcium carbonate, barium sulfate, fillers, zinc stearate, mold releasing agents, degassing agents, additives, inhibitors, thixotropes, thickening agents, resin curing agents, accelerators, promoters, catalysts, cross-linking agents, and combinations thereof.